Smart-UPS DP
Uninterruptible Power Supply

Models

SUDP4000I, SUDP6000I, SUDP8000I, SUDP10000I

Service Manual

www.apcc.com

990-1008, Revision 1, 4/99

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1. Introduction

Smart-UPS DP Service procedures should only be performed by authorized electricians or personnel who have been specifically trained to service Smart-UPS DP systems.

Whenever AC and/or DC voltage is applied there may be AC voltage at the UPS output, because the UPS can supply output power from mains and from its batteries. To avoid equipment damage or personal injury, always assume that there may be voltage at the UPS output.

This unit contains components that are sensitive to electrostatic discharge (ESD). Failing to follow proper ESD procedures can result in severe damage to electronic components.

WARNING

Make sure that mains supply is switched off before any service is carried out on the Smart-UPS DP.

1.1 Service Policy

The purpose of the Smart-UPS DP system is to protect electronic equipment against breakdowns that can result from an unstable power supply. The Smart-UPS DP system improves data safety, system up-time, and operational security during normal operations.

It is APC's policy to deliver reliable, high quality products. This is stated in APC's quality system.

Quality assurance begins during product development where we design our Smart-UPS DP in consideration of:

- using few components to minimize errors
- choosing the market's best components from approved suppliers
- following the operating principles, which ensure reliability and operating safety
- making the system easy to install and control
- making the system easy to maintain
- ensuring an environmentally friendly installation

During production, we ensure the quality through a large number of tests of components, modules and systems. Further, education of our production employees and optimizing the production process, enhance production quality.

It is APC's goal to make 100% up-time possible for the installations of our customers.

The Smart-UPS DP system is designed for longevity and experience, most APC UPS systems function at least 10 years. This, however, requires that the system is checked and maintained regularly. We therefore recommend our customers to follow APC's maintenance programs.

1.2 A Smart-UPS DP System Must Be Maintained

Even though APC's systems are designed and produced by the latest and safest technology, all Smart-UPS DP systems must be maintained.

The system contains components and parts which, in time, will be worn out or have a limited life. These parts must be checked and, in the course of time, replaced to avoid defects in the system.

APC guaranties delivery of spare parts for all Smart-UPS DP systems for at least 10 years after ending the production of the product.

APC recommends a service contract for all Smart-UPS DP installations. A service contract will ensures that the Smart-UPS DP system is always in perfect condition to protect the critical installation against power failure. You can sign up for a service contract with any authorized APC service center.

A service contract includes thorough inspection and test of the system in determined intervals and worn parts and components with limited life will be replaced in time. Furthermore, we ensure the customer against

extraordinary unforeseen expenses, as a service contract can include all necessary extraordinary services and repairs. For further information, please contact your local APC company, or APC partner.

1.3 Replacement and Maintenance Program

Experience shows that some electromechanical and electrical components are exposed to loads, which cause wear and tear and limited life. As a minimum, APC recommends that the following components and parts in the Smart-UPS DP system should be replaced according to the following time periods:

Part	**Typical Life Time**
Fan	3 years
Standard battery	3 years
Long life battery	6 - 8 years
External battery	Dependent on chosen type and brand
AC and DC capacitor module	6-9 years
Lithium battery module in controller board	10 years

APC Smart-UPS DP service repairs should only be performed by trained personnel.

In addition, the Smart-UPS DP system should also be inspected once a year by trained personnel for the following items:

- Visual check
- Cleaning, air flow, and environment
- Temperature
- Fuses
- Input and output parameters, plus battery charge current and battery circuit
- Event log, alarms and indicators
- Synchronization
- Circuit breakers
- Fans
- Battery
- Operation
- Accessories and options
- Communication software and interface for computers

1.4 APC Authorized Service Centers

Each authorized APC service facility in Europe, the USA, the Middle East, and Asia is staffed with trained and experienced personnel who:

- can be contacted 24 hours a day
- can answer all support calls
- carry a total inventory of spare parts and modules
- have newest and best testing equipment and tools
- have technical documentation for all of APC's products

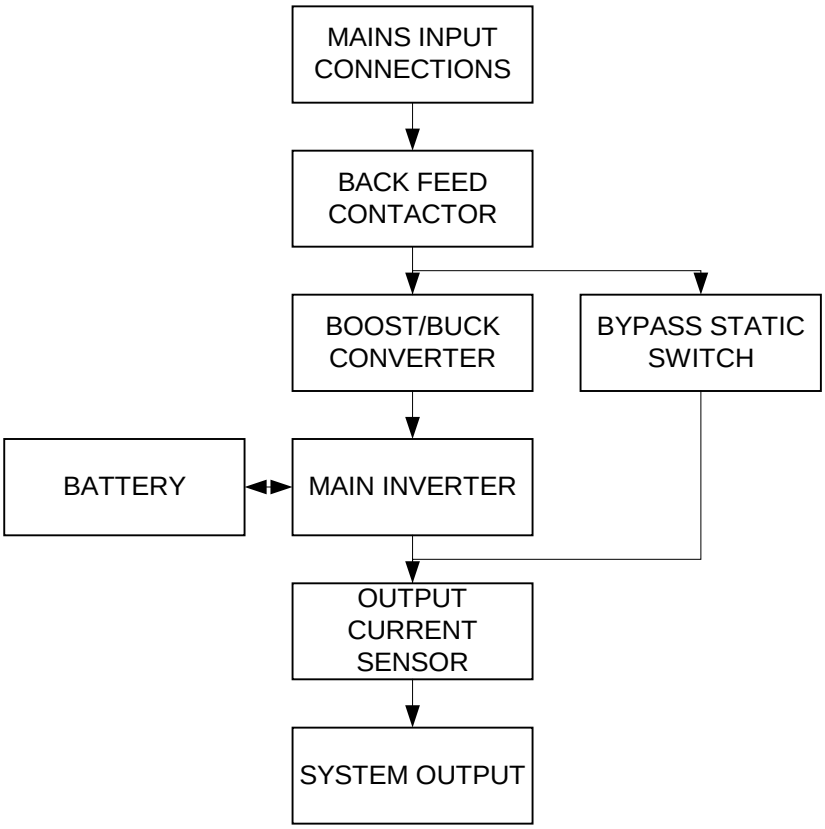
In addition, APC service centers offer training and education for customer employees as well as up-to-date service manuals.

For more information about Smart-UPS DP products and services, please contact APC or an APC partner.

2. Functional Description

2.1 Functional Description

2.1.1 Block Diagram



2.1.2 Block Diagram Description

MAINS INPUT CONNECTIONS

Function: To ensure safe and proper connection of the Smart-UPS DP.

This is the mains connection of the unit. The mains is connected via power terminals. This is also the location of the RFI-filters, which are supplying the PSU.

BACK FEED CONTACTOR

Function: The back feed contactor ensures that there is no feedback to the mains during mains failure.

The back feed contactor is located just after the input terminals at the input connections.

BYPASS STATIC SWITCH

Function: The bypass static switch ensures switching from normal operation, battery operation, to bypass operation without any interruptions to the load.

BOOST/BUCK CONVERTER

Function: The boost/buck converter controls the power factor and regulates the input current. The boost/buck converter makes up for any difference between the output of the Smart-UPS DP and the mains voltage. The boost/buck converter is an electronic choke and works as such. Therefore, the boost/buck converter has a huge internal resistance. Contrary to this, the main inverter is controlled as a constant voltage generator and has, therefore, a very low internal resistance. Together these two inverters protect the load against mains transients. They also protect the mains against harmonic reflections from the load. The control of the boost/buck converter ensures that the unit is always drawing a sinusoidal current from the mains

MAIN INVERTER

Function: During mains operation, the main inverter is always synchronous to the mains and works as a voltage stabilizer on the output voltage. If the load causes harmonic current on the output, the main inverter will support these currents, hence the control of the boost/buck converter prevents them being taken from the mains. The main inverter helps charge the batteries by passing the turned over energy from the input to the batteries. During battery operation the main inverter supplies the load with energy from the batteries. During battery operation the main inverter is kept at the desired frequency by means of the internal clock frequency.

BATTERY

Function: The battery stores energy to be used during battery operation. All units have built-in batteries. The batteries are located in the bottom of the unit. More batteries can be added to increase the back-up time.

OUTPUT CURRENT SENSOR

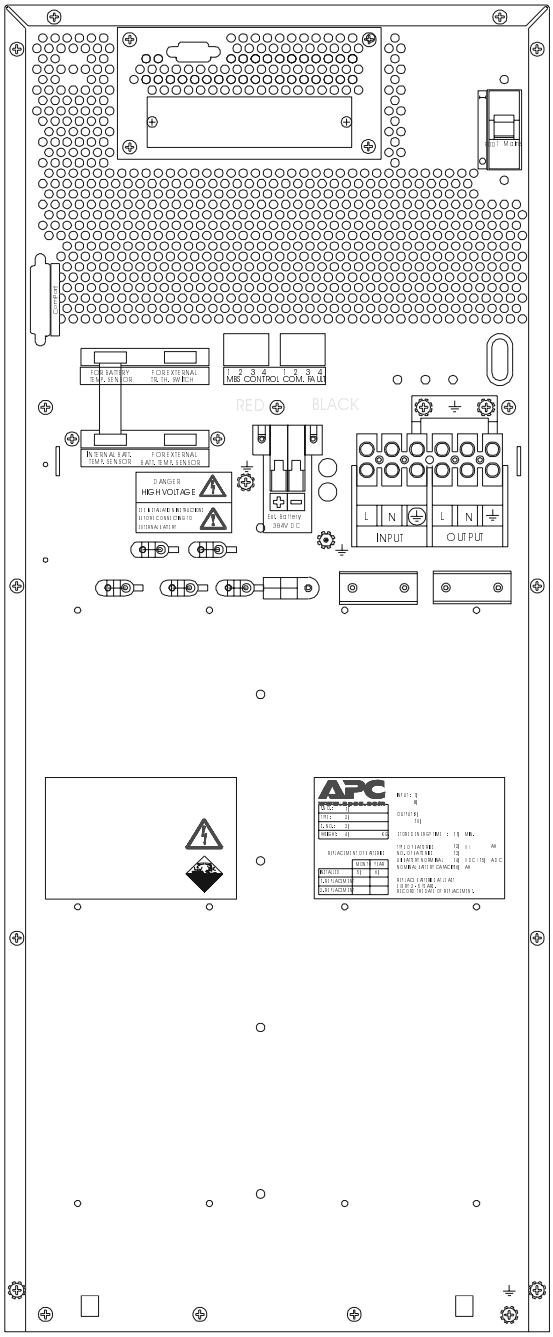
Function: The Output Current Sensor is used to measure the output current in order to indicate if the system is overloaded.

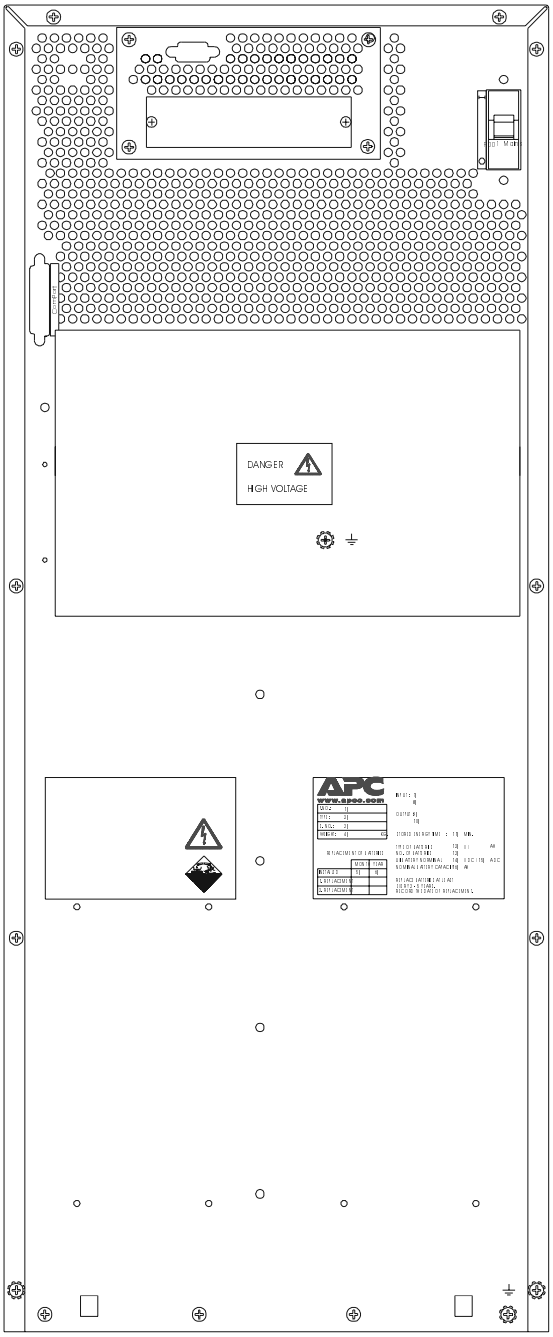
SYSTEM OUTPUT

Function: Ensure safe and proper connection of the load.

This is the output of the Smart-UPS DP

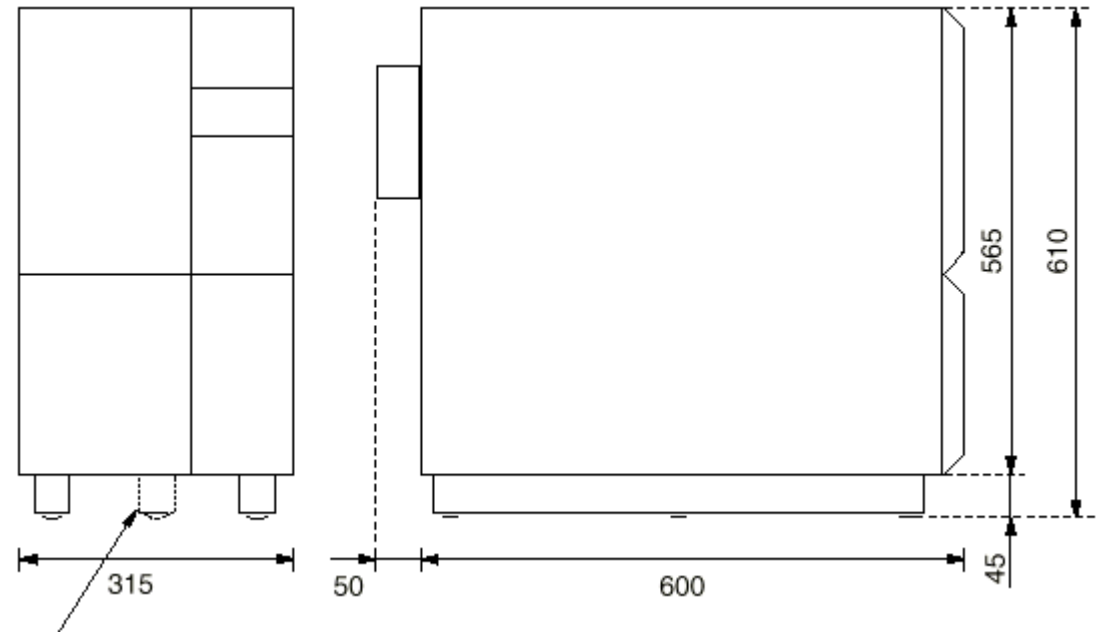
3. Mechanical Layout





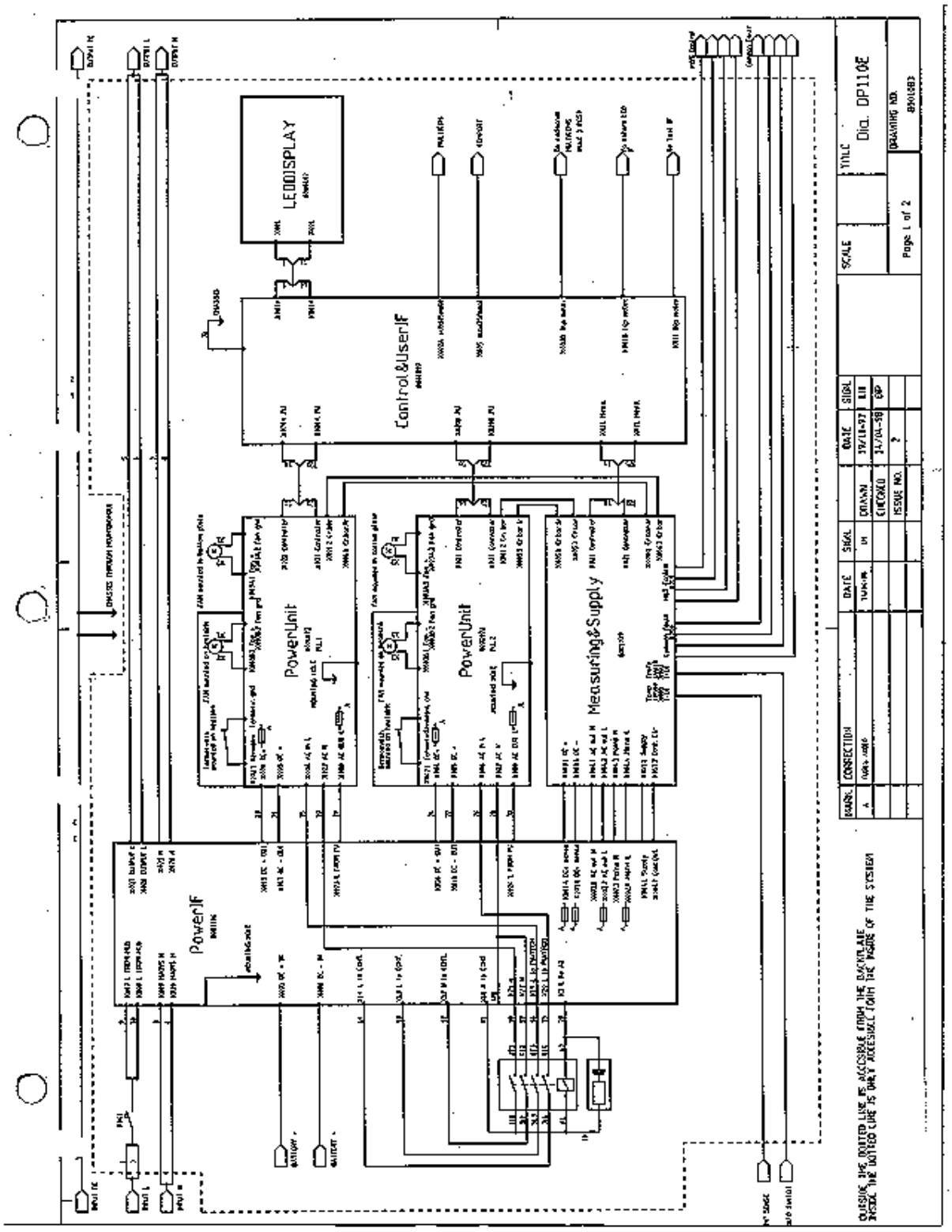
Front view

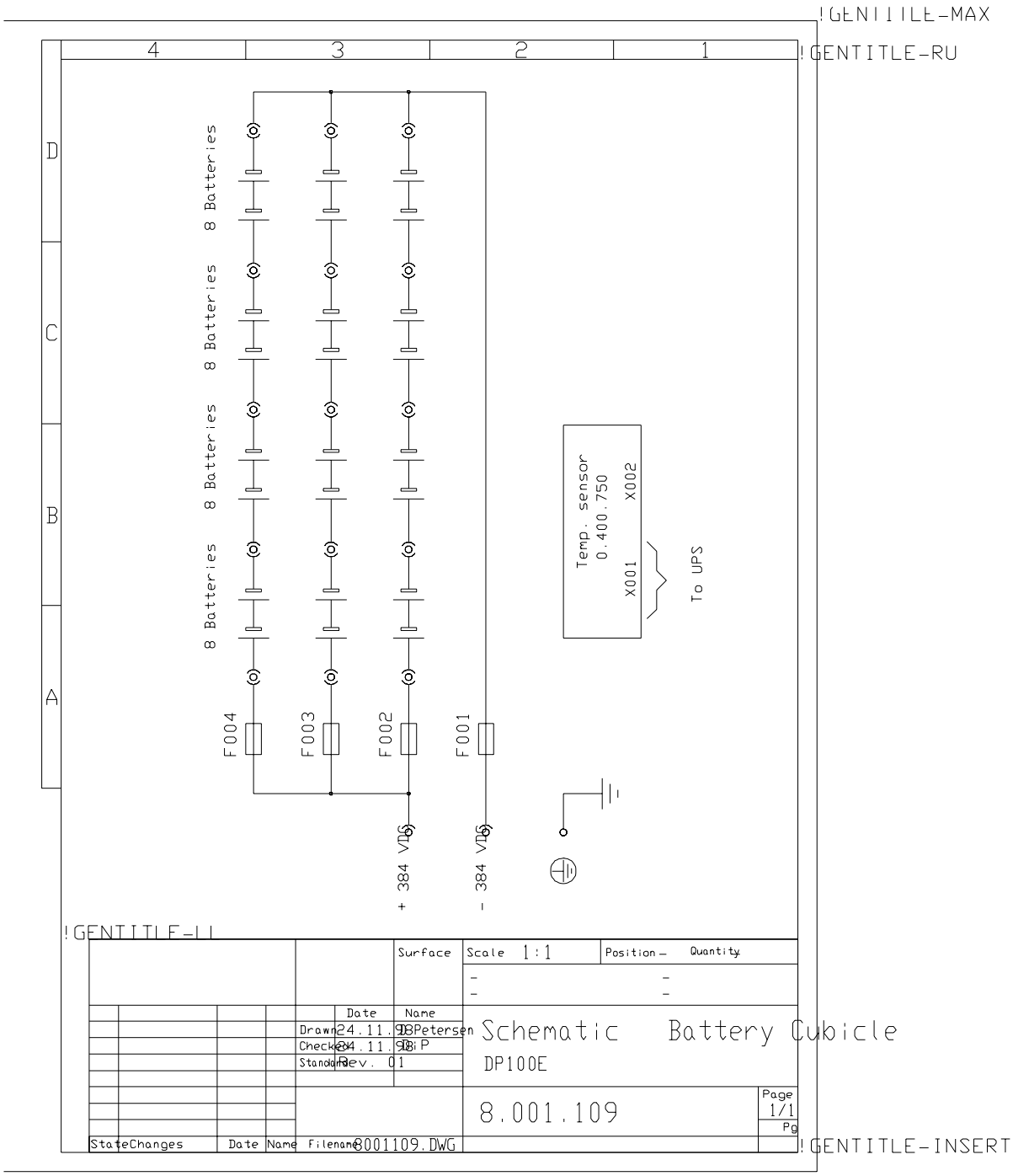
Side view



only battery modules

4. Main Diagram




!GENTITLE-MAX
!GENTITLE-RU
4
3
2
1
D
C
B
A
8 Batteries
8 Batteries
8 Batteries
8 Batteries
F004
F003
F002
F001
+ 384 VDC
- 384 VDC
Temp. sensor
0.400.750
X001
X002
To UPS
!GENTITLE-LL
Surface
Scale 1:1
Position –
Quantity
Date
Name
Drawn 24.11.98 Petersen
Checked 24.11.98 DiP
Standard Rev. 01
Schematic Battery Cubicle
DP100E
8.001.109
Page 1/1
Pg
StateChanges
Date
Name
Filename 8001109.DWG
!GENTITLE-INSERT

5. Spare Part Lists

5.1 SUDP4000I

Part No.	Description	Item	Level	Qty.	Net. Price
0017202	Fuse 32A 400Vdc AM		1	10	
0017069	Fuse 40A F 600V		1	10	
0017067	Fuse 25A 500V FF		1	10	
0017017	Fuse 2,5A T 250V		1	10	
0017006	Fuse 315mA F 250V		1	10	
0017007	Fuse 500mA T 250V		1	10	
0017019	Fuse 5A F 500V		1	10	
0020035	Fan		2	2	
0400793	Control & User IF		3	1	
0400763	Power IF		3	1	
0400768	Meas & Supply		3	1	
0400749	LED - display		3	1	
0400750	Temp. sensor		3	1	
0901339	Battery pack 32 x 7,2Ah/12 Panasonic		4	1	
0901377	Sub. Ass. PU DP100E		4	1	
0W0436	Wire harness 10” smart-slot				
0G-Unicornss	Module Assy.				

5.2 SUDP6000I

Part No.	Description	Item	Level	Qty.	Net. Price
0017202	Fuse 32A 400Vdc AM		1	10	
0017070	Fuse 16A F 600V		1	10	
0017067	Fuse 25A 500V FF		1	10	
0017017	Fuse 2,5A T 250V		1	10	
0017006	Fuse 315mA F 250V		1	10	
0017007	Fuse 500mA T 250V		1	10	
0017019	Fuse 5A F 500V		1	10	
0017070	Fuse 16A FF 400V		1	10	
0020035	Fan		2	2	
0400793	Control & User IF		3	1	
0400766	Power IF		3	1	
0400768	Meas & Supply		3	1	
0400749	LED - display		3	1	
0400750	Temp. sensor		3	1	
0901339	Battery pack 32 x 7,2Ah/12 Panasonic		4	1	
0901326	Sub. Ass. PU DP100E		4	1	
0W0436	Wire harness 10” smart-slot				
0G-Unicornss	Module Assy.				

5.3 SUDP8000I

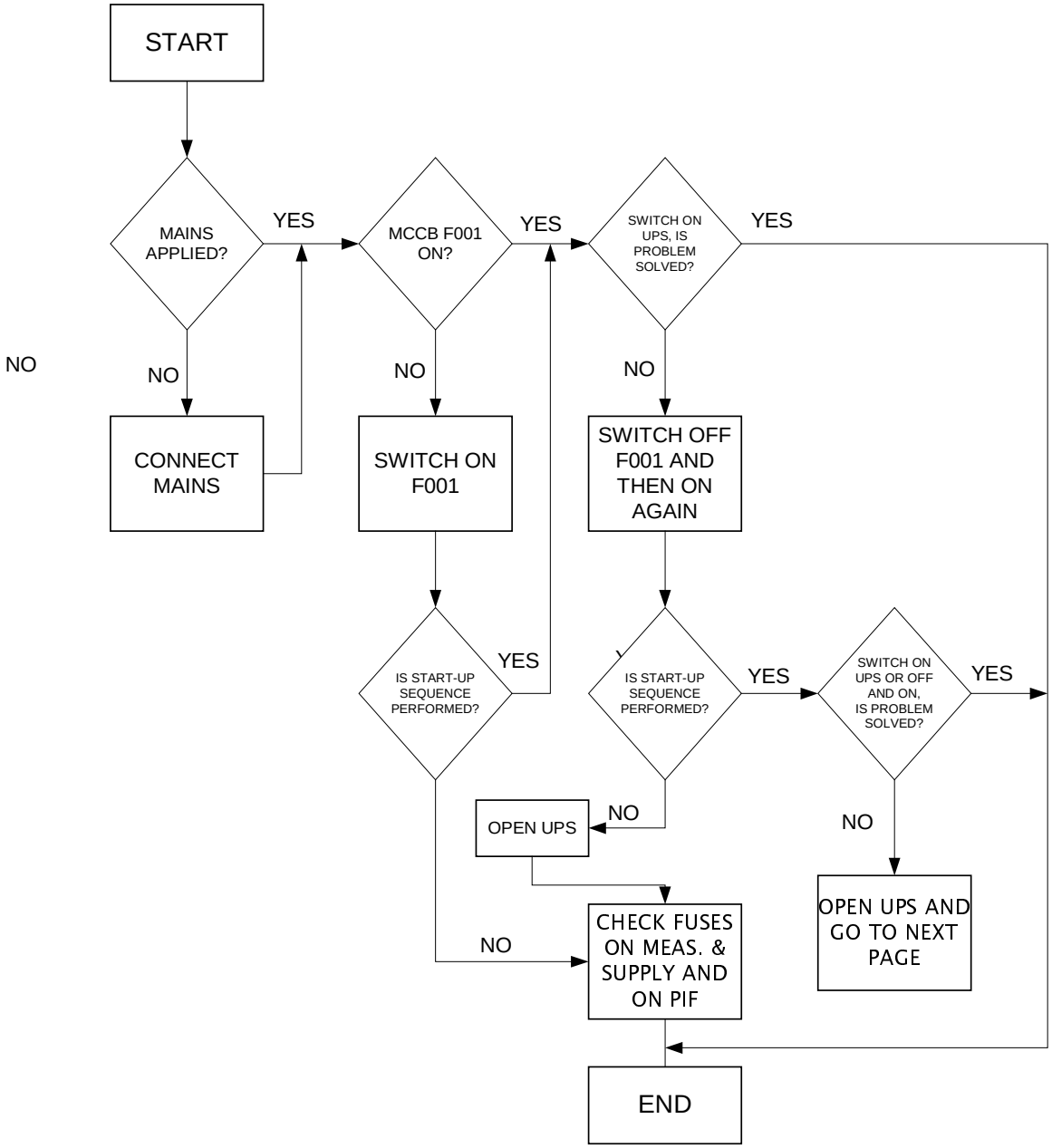
Part No.	Description	Item	Level	Qty.	Net. Price
0017202	Fuse 32A 400Vdc AM		1	10	
0017069	Fuse 40A F 600V		1	10	
0017067	Fuse 25A 500V FF		1	10	
0017017	Fuse 2,5A T 250V		1	10	
0017006	Fuse 315mA F 250V		1	10	
0017007	Fuse 500mA T 250V		1	10	
0017019	Fuse 5A F 500V		1	10	
0020035	Fan		2	2	
0400793	Control & User IF		3	1	
0400766	Power IF		3	1	
0400768	Meas & Supply		3	1	
0400749	LED - display		3	1	
0400750	Temp. sensor		3	1	
0901339	Battery pack 32 x 7,2Ah/12 Panasonic		4	1	
0901377	Sub. Ass. PU DP100E		4	1	
0W0436	Wire harness 10” smart-slot				
0G-Unicornss	Module Assy.				

5.4 SUDP10000I

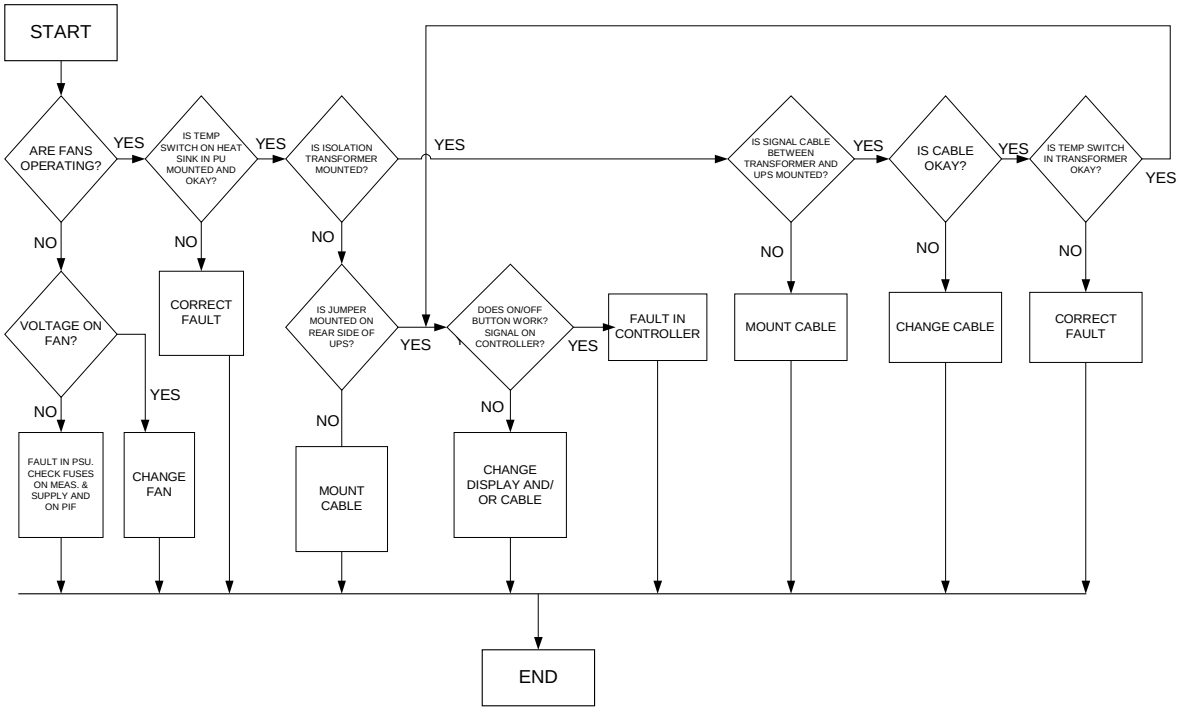
Part No.	Description	Item	Level	Qty.	Net. Price
0901312	Sub. Ass. PU DP100E		3	2	
0400739	Control & User IF		2	1	
0400740	Power IF		2	1	
0400751	Meas & Supply		2	1	
0400749	LED - display		2	1	
0400750	Temp. sensor		2	1	
0020035	Fan		1	2	
0017202	Fuse 32A 400Vdc AM		1	10	
0017069	Fuse 40A F 600V		1	10	
0017067	Fuse 25A 500V FF		1	10	
0017017	Fuse 2,5A T 250V		1	10	
0017006	Fuse 315mA F 250V		1	10	
0017007	Fuse 500mA T 250V		1	10	
0017019	Fuse 5A F 500V		1	10	
0W0436	Wire harness 10” smart-slot				
0G-Unicornss	Module Assy.				

6. Troubleshooting

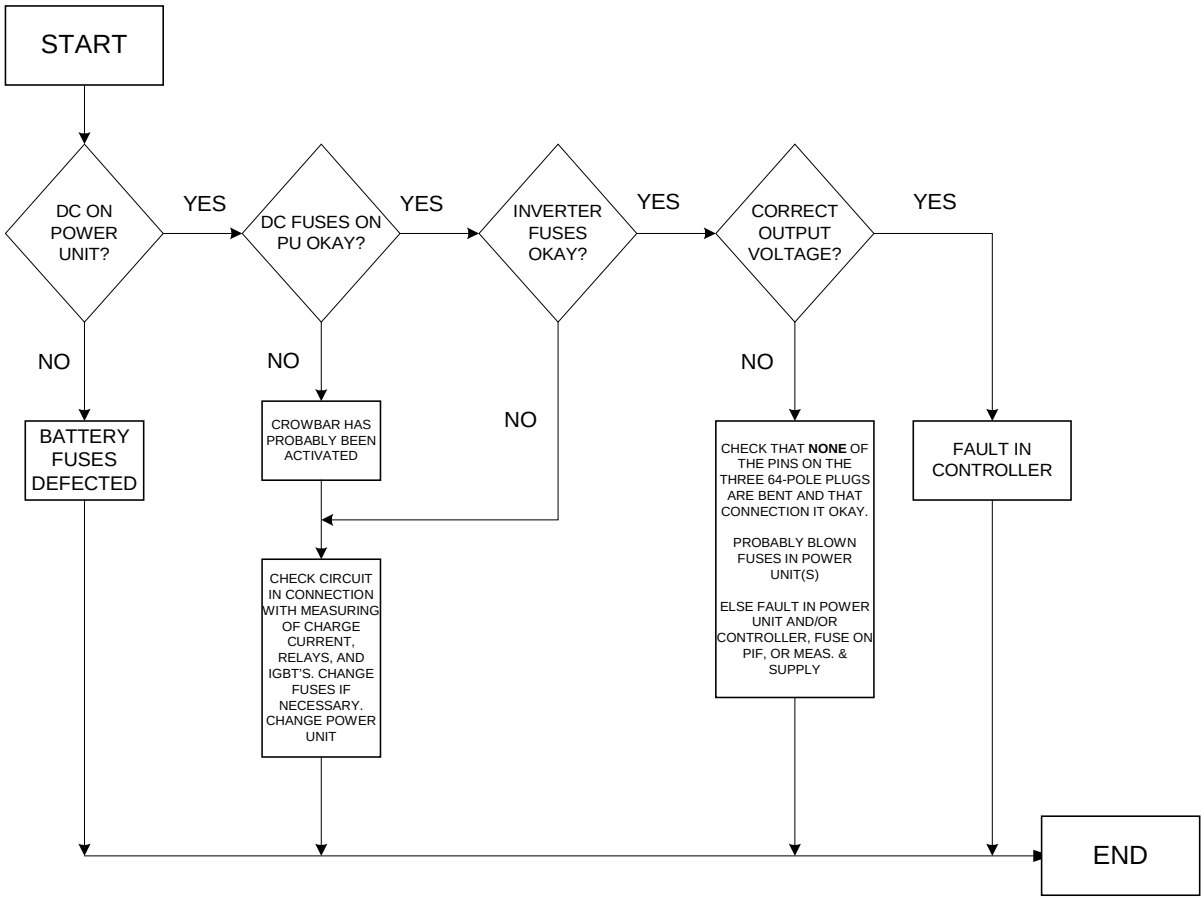
6.1 Smart-UPS DP does not start



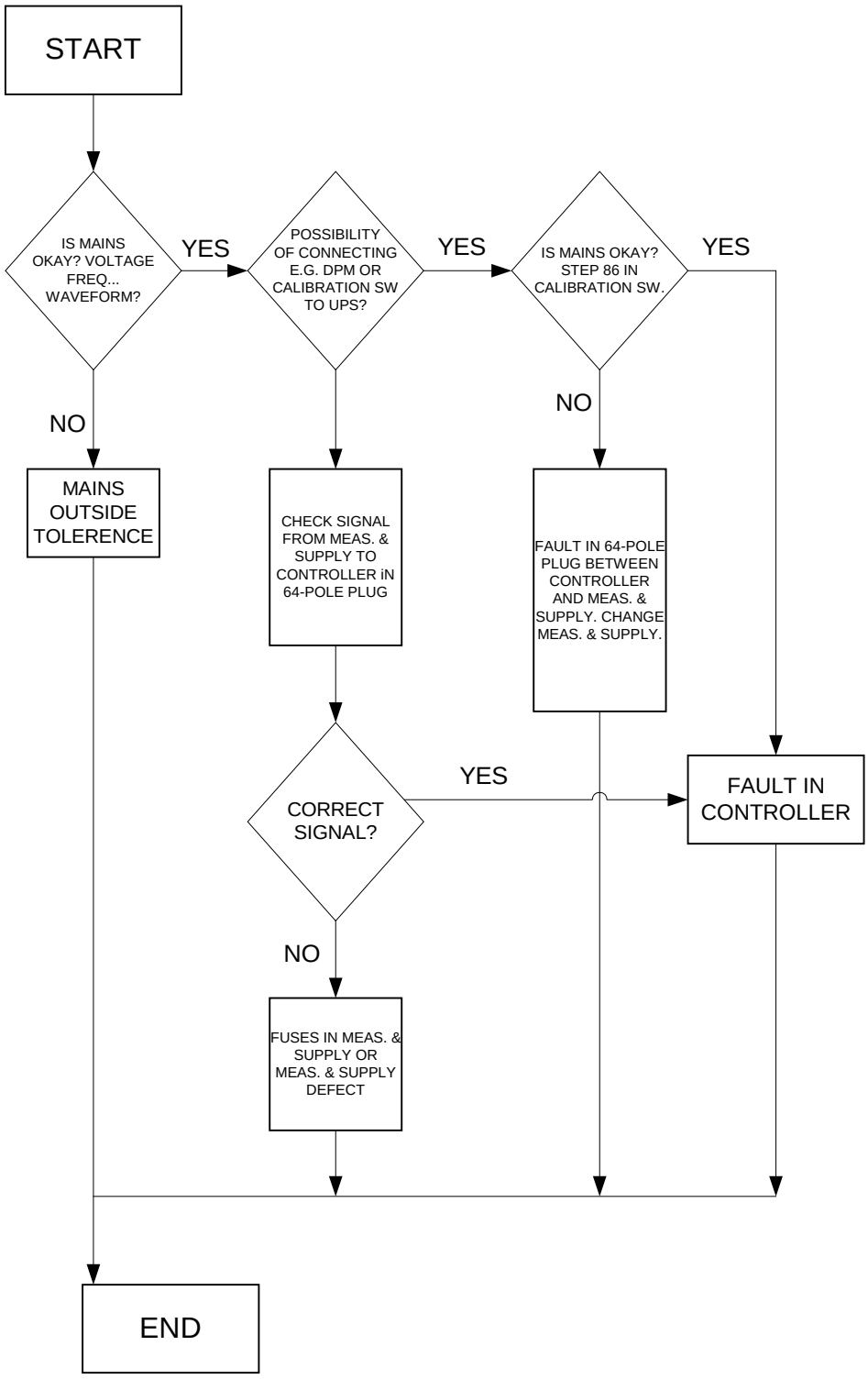
6.2 Smart-UPS DP does not start. Mains connected and start-up sequence is performed. Smart-UPS DP is open.



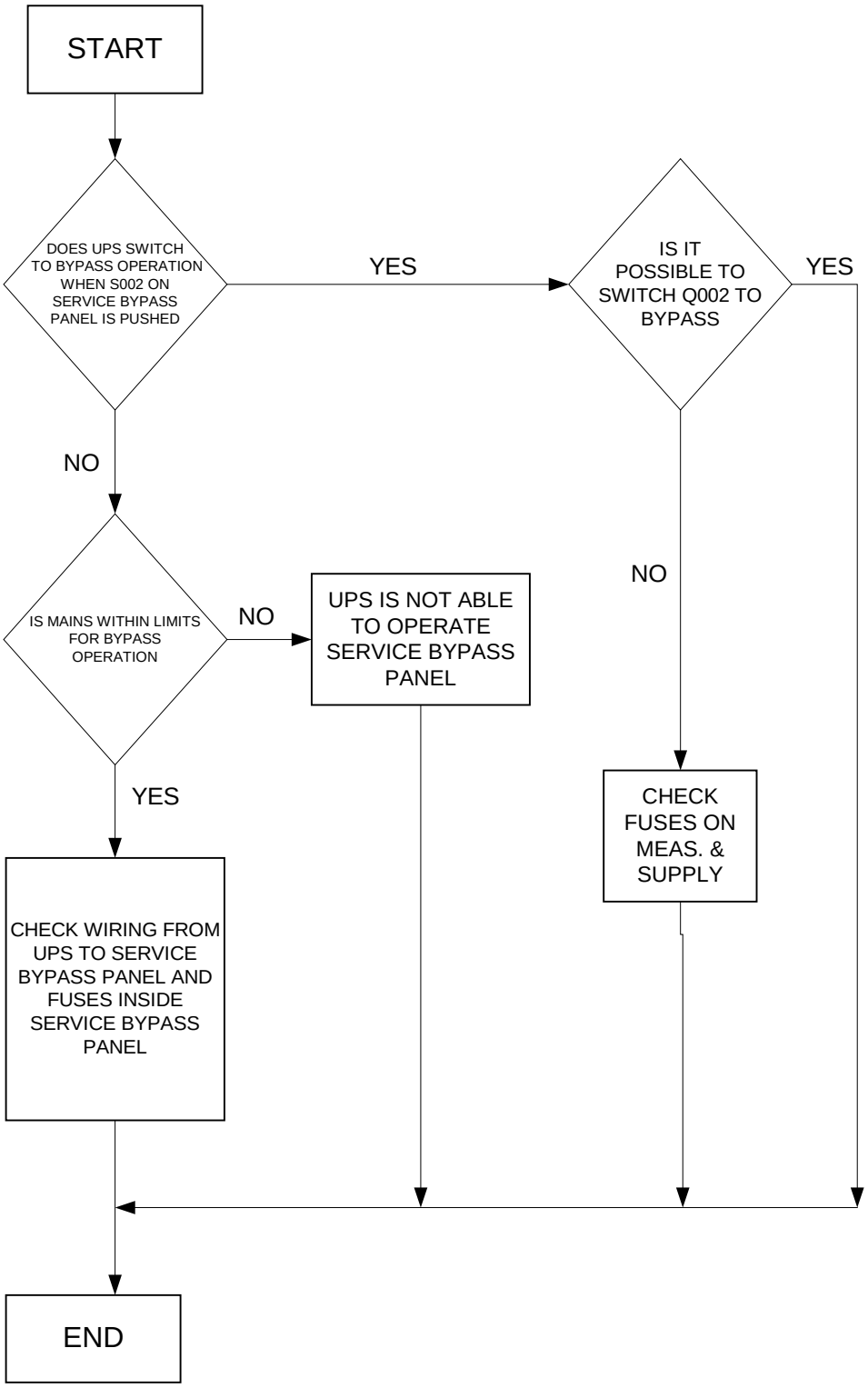
6.3 Smart-UPS DP only operates 5 seconds after start-up. “Undervoltage Timer” active.


START
DC ON POWER UNIT?
YES
DC FUSES ON PU OKAY?
YES
INVERTER FUSES OKAY?
YES
CORRECT OUTPUT VOLTAGE?
YES
NO
BATTERY FUSES DEFECTED
NO
CROWBAR HAS PROBABLY BEEN ACTIVATED
NO
CHECK CIRCUIT IN CONNECTION WITH MEASURING OF CHARGE CURRENT, RELAYS, AND IGBT'S. CHANGE FUSES IF NECESSARY. CHANGE POWER UNIT
NO
CHECK THAT NONE OF THE PINS ON THE THREE 64-POLE PLUGS ARE BENT AND THAT CONNECTION IT OKAY.
PROBABLY BLOWN FUSES IN POWER UNIT(S)
ELSE FAULT IN POWER UNIT AND/OR CONTROLLER, FUSE ON PIF, OR MEAS. & SUPPLY
FAULT IN CONTROLLER
END

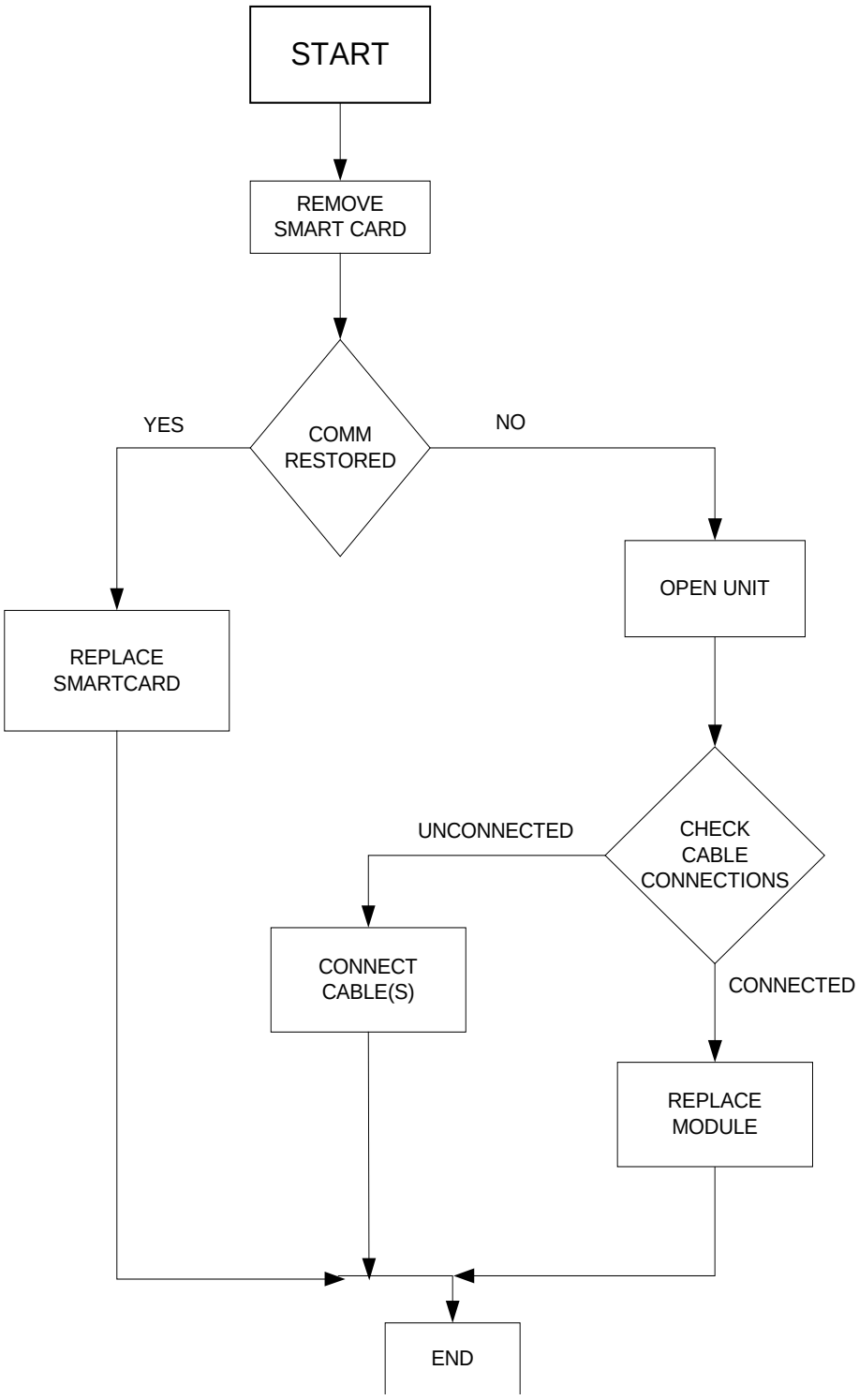
6.4 Smart-UPS DP not able to switch to normal operation.


START
IS MAINS OKAY? VOLTAGE FREQ... WAVEFORM?
YES
POSSIBILITY OF CONNECTING E.G. DPM OR CALIBRATION SW TO UPS?
YES
IS MAINS OKAY? STEP 86 IN CALIBRATION SW.
YES
NO
NO
MAINS OUTSIDE TOLERENCE
CHECK SIGNAL FROM MEAS. & SUPPLY TO CONTROLLER iN 64-POLE PLUG
FAULT IN 64-POLE PLUG BETWEEN CONTROLLER AND MEAS. & SUPPLY. CHANGE MEAS. & SUPPLY.
CORRECT SIGNAL?
YES
FAULT IN CONTROLLER
NO
FUSES IN MEAS. & SUPPLY OR MEAS. & SUPPLY DEFECT
END

6.5 Smart-UPS DP is running in normal operation and mounted with Service Bypass Panel. Service Bypass Panel is not operating.


START
DOES UPS SWITCH TO BYPASS OPERATION WHEN S002 ON SERVICE BYPASS PANEL IS PUSHED
YES
IS IT POSSIBLE TO SWITCH Q002 TO BYPASS
YES
NO
NO
IS MAINS WITHIN LIMITS FOR BYPASS OPERATION
NO
UPS IS NOT ABLE TO OPERATE SERVICE BYPASS PANEL
YES
CHECK FUSES ON MEAS. & SUPPLY
CHECK WIRING FROM UPS TO SERVICE BYPASS PANEL AND FUSES INSIDE SERVICE BYPASS PANEL
END

6.6 Loss of UPS-Link communicator



7. Changing Modules

This chapter contains instructions for performing the following procedures:

Note:

If the Smart-UPS DP has been installed with a service bypass panel, the load must be switched over to mains before any of the following procedures can be performed.

7.1 Switching off the Smart-UPS DP

7.2 Removing the cover placed above the external connections

7.3 Removing the external DC-supply

7.4 Opening the Smart-UPS DP

7.5 Removing the internal DC-supply

7.6 Removing cables for external units

7.7 Removing the smart slot board chassis

7.8 Removing the controller board

7.9 Removing the power unit board 2 (upper)

7.10 Removing the power unit board 1 (lower)

7.11 Removing the power interface board

7.12 Removing the measuring and supply board

7.13 Removing the batteries

7.14 Removing the LED-board

7.15 Removing the battery temperature sensor board

7.16 Removing the electronic shelf fan

When performing remounting procedures, the appropriate instructions should be reversed.

WARNINGS

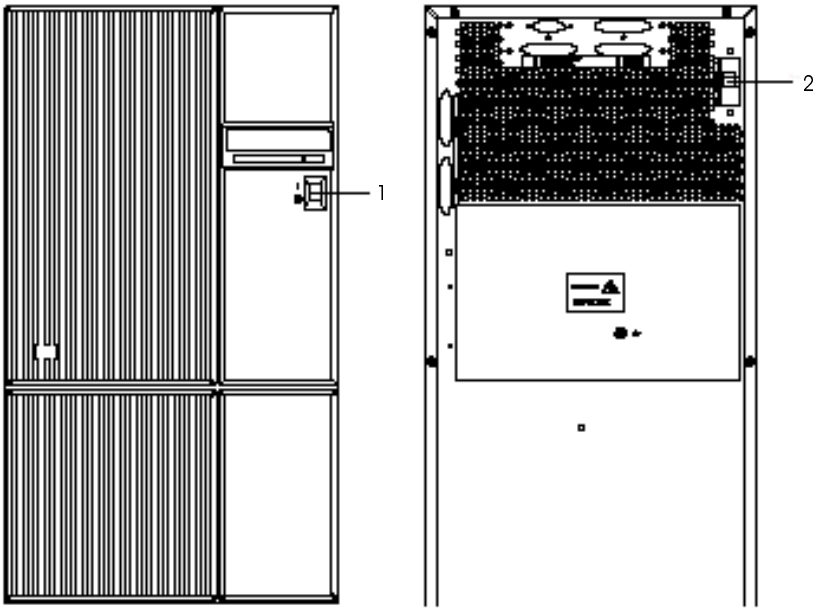
Before changing modules or batteries,
make sure that mains supply and DC-supply have been switched off.

Remember, the UPS contains static sensitive devices.

7.1 Switching Off the Smart-UPS DP

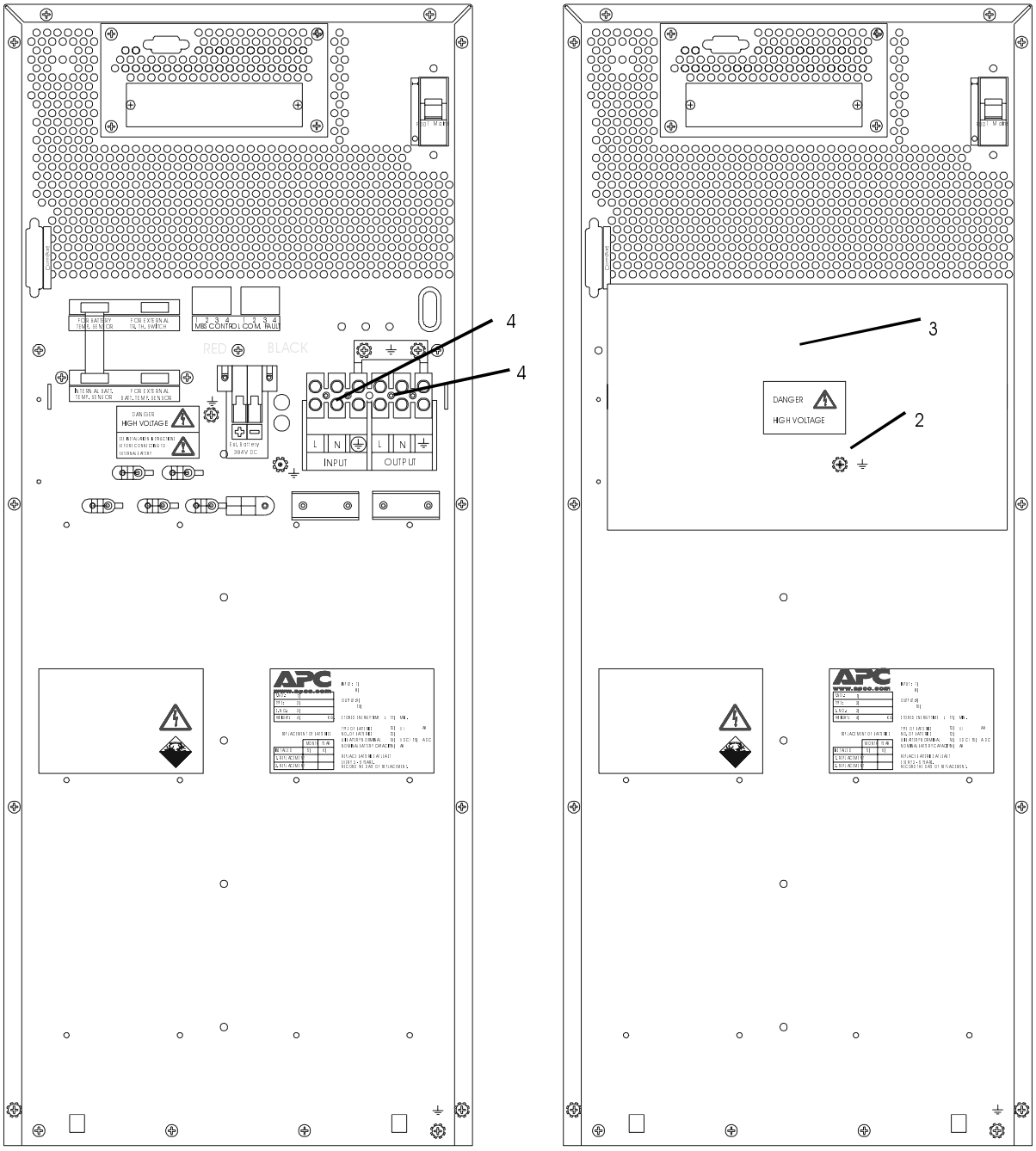
A possible load must be switched off, or switched over to the mains via the service bypass panel.

1. Switch off the Smart-UPS DP on the front of the system.
2. Switch off MCCB (F001) on the rear side of the system.
3. Switch off mains supply to the Smart-UPS DP.



7.2 Removing the Cover Placed Above the External Connections

1. Switch off the Smart-UPS DP (7.1).
2. Remove the screw.
3. Lift the cover upwards and pull out.
4. Make sure that there is no AC-voltage on in- and output of the Smart-UPS DP.



Remove external DC-supply (7.3)

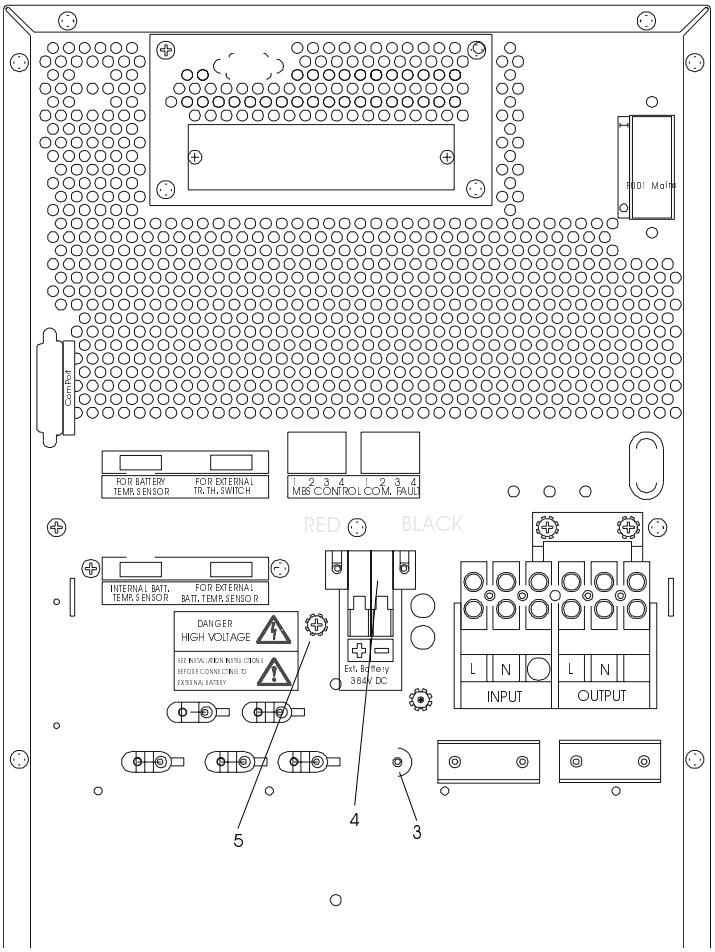
7.3 Removing the External DC-Supply

Switch off external battery switch and remove external battery fuse.

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the cable relief..
4. Remove the DC-connector.
5. Remove the earth connection.

WARNING

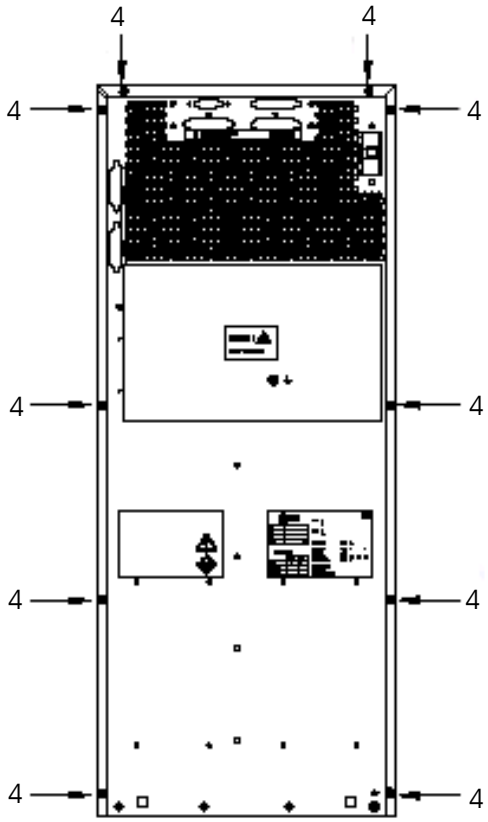
HIGH VOLTAGE! Safety precautions for working with high voltage must be kept.

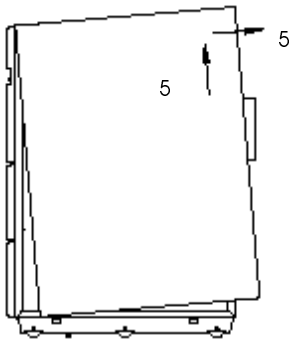


7.4 Opening the Smart-UPS DP

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Remove the screws on rear side of the system that hold the cover on.
5. Remove the cover by sliding the rear end of the cover upwards and back.

WARNING
Take care not to drop the front edge of the cover into the power unit.



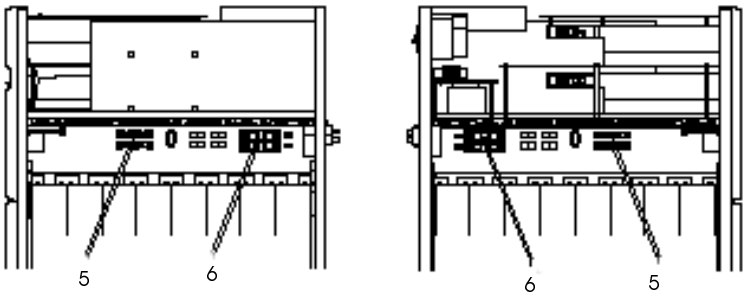


7.5 Removing the Internal DC-Supply

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the battery plug from the middle plate below the electronic shelf.
6. Using isolated fuse tongs, remove the battery fuses.

WARNING

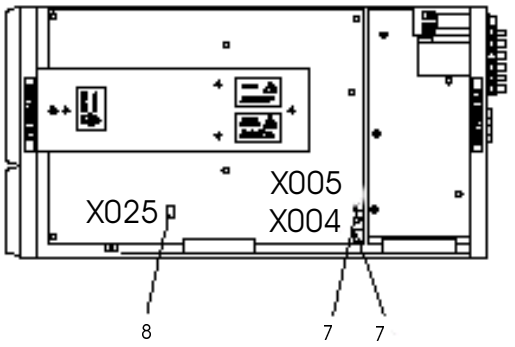
HIGH VOLTAGE! Safety precautions for working with high voltage must be kept.



7. Make sure (by measuring) that there is no DC-voltage between X004 (DC 438V+) and X005 (DC 438V-) on upper power unit.
8. Make sure (by measuring connector X025) that there is no voltage on the capacitors on the power unit.

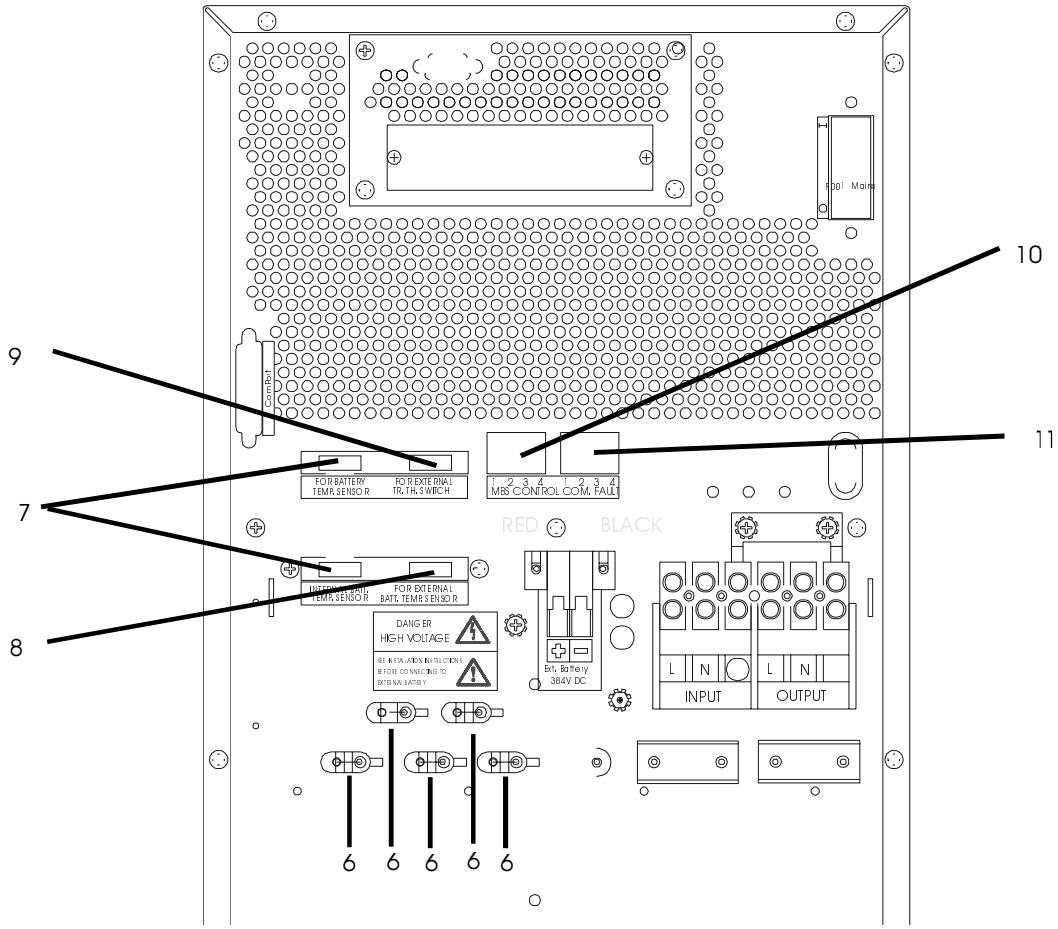
WARNING

The capacitors have a long discharging time (5 min.)



7.6 Removing Cables for External Units

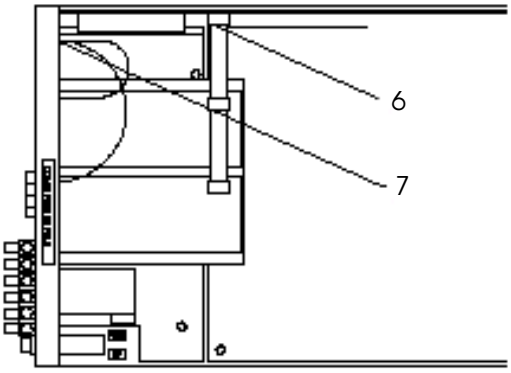
1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove the cable relief belonging to the cable being removed. Then choose the cable(s) to be removed.
7. Remove the connector for the internal battery temperature sensor.
8. Remove the connector for the external battery temperature sensor.
9. Remove the connector for the external transformer thermal switch.
10. Remove the cable for the SBP controlling (MBS control).
11. Remove the common fault relay cable.



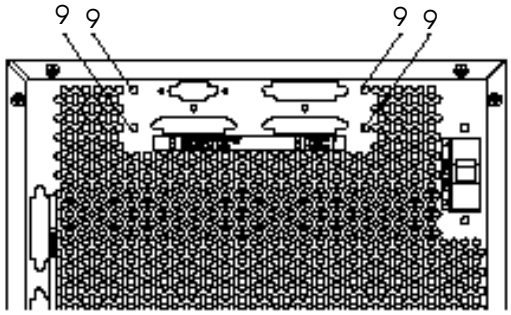
External DC-supply, see section: "7.3 Remove External DC-Supply".

7.7 Remove the SmartSlot

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove the external unit's cables (7.6).
7. Remove the ribbon cable from the controller board.



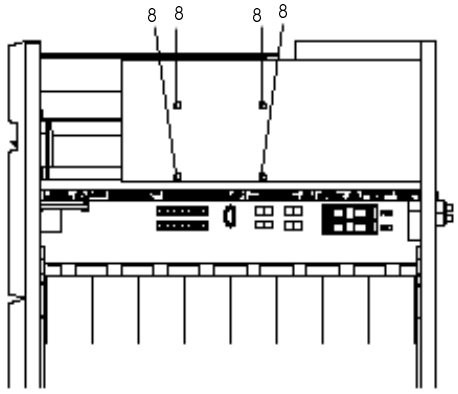
8. Remove the earth wires from the option board.
9. Remove the 4 screws connecting the SmartSlot.



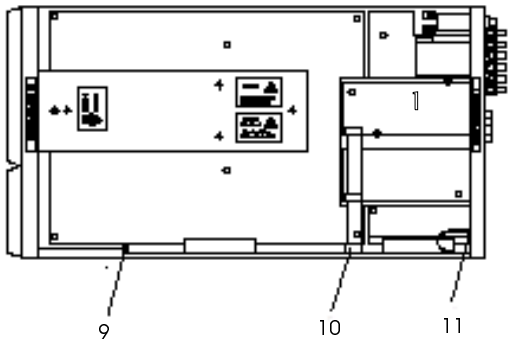
The SmartSlot is now free.

7.8 Removing the Controller Board

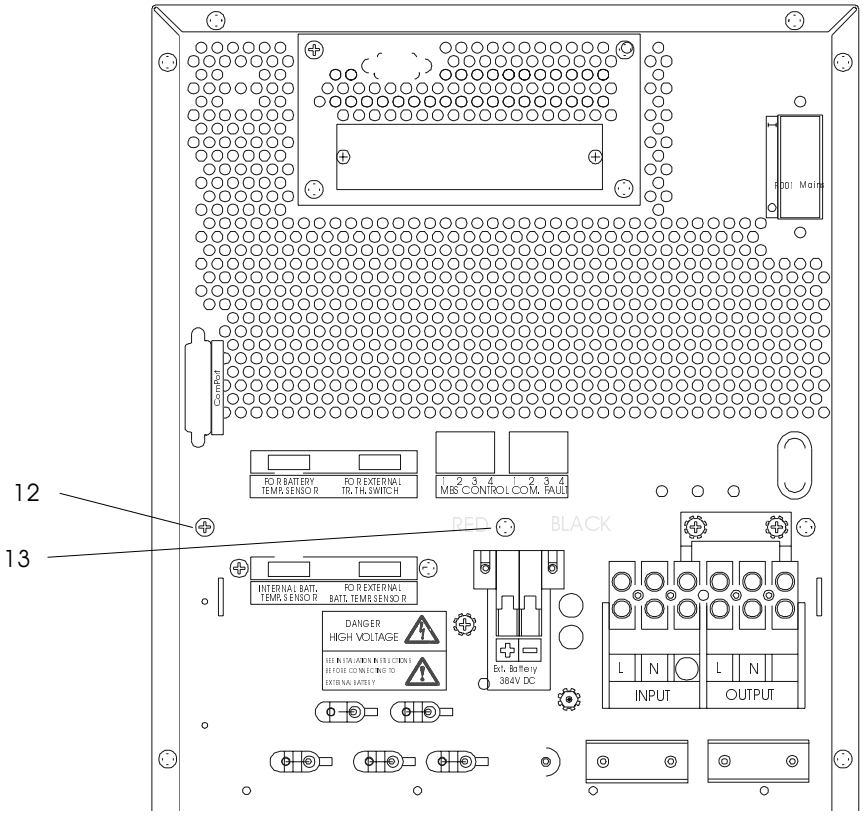
1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove the external unit's cables (7.6).
7. Remove the SmartSlot (7.7)
8. Remove the 2 (4) screws that connect the CU-board to the PU-board(s).



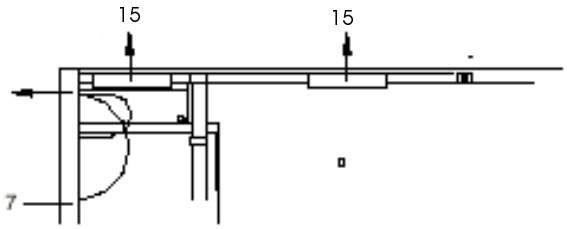
9. Remove the LED-display ribbon cable.
10. Remove the options ribbon cable.
11. Remove the grounding wire from the chassis.



12. Remove the screw from the back of the system.
13. Loosen screw from the back of the system.



14. Move the back plate slightly backwards, so that the SUB-D plugs are free from the plate.
15. Remove the controller board from the connectors in the PU and measuring boards.

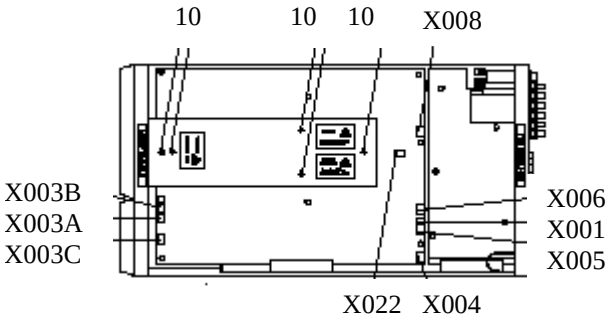


WARNING

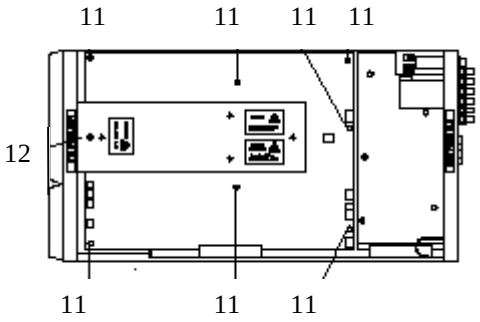
Take care not to bend the connector pins.

7.9 Removing the Power Unit Board 2 (Upper)

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove any cables for external units (7.6).
7. Remove the SmartSlot (7.7).
8. Remove the controller board (7.8).
9. Remove the wires on the power unit terminals X004, X005, X006, X022, X008, and X001, as well as the connector for the fan shelf at X003 A, B, or C.
10. Remove the cover plate for heat sink.



11. Remove the screws that connect the PU-board.
12. Remove the stay at fan.



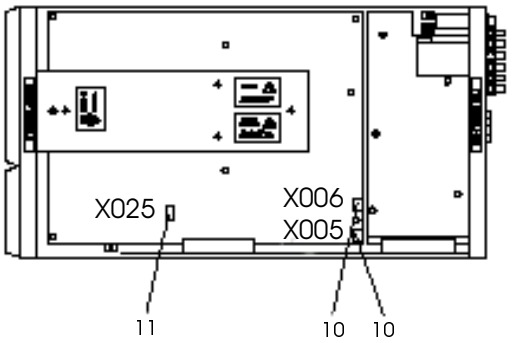
The board is now free.

7.10 Removing the Power Unit Board 1 (Lower)

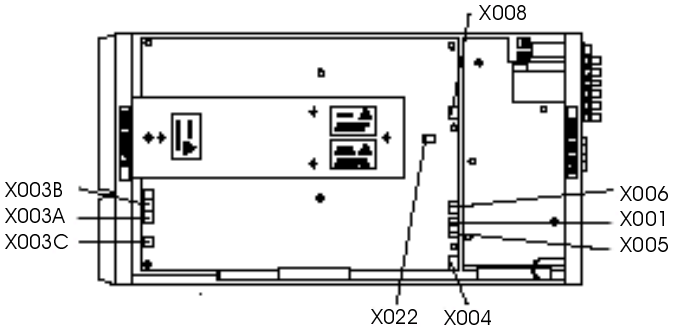
1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove the external unit cables (7.6).
7. Remove the SmartSlot (7.7).
8. Remove the controller board (7.8).
9. Remove the power unit board 2 (if mounted) (7.9).
10. Make sure (by measuring) that there is no DC-voltage between X004 (DC 438V+) and X005 (DC 438V-) on the upper power unit.
11. Make sure (by measuring on connector X025) that there is no voltage on electrolytes on the power unit.

WARNING

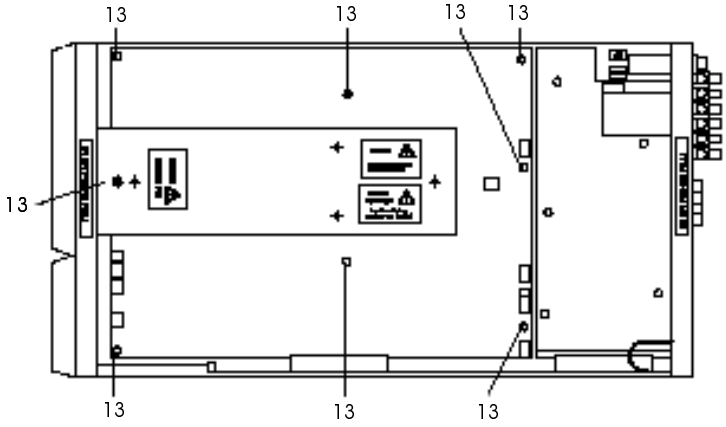
The capacitors have a long charging time (5 min.)



12. Remove wires on terminals X004, X005, X006, X022, X008, and X001, as well as the connector for the fan shelf at X003 A, B, or C.



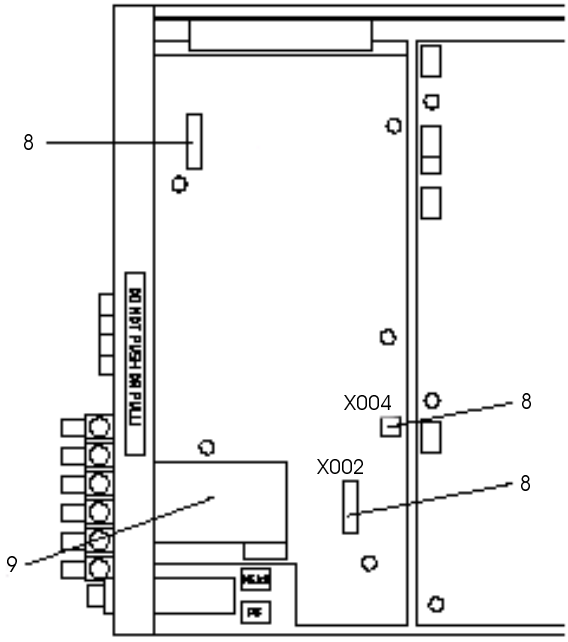
13. Remove the stay/screws connecting the board.



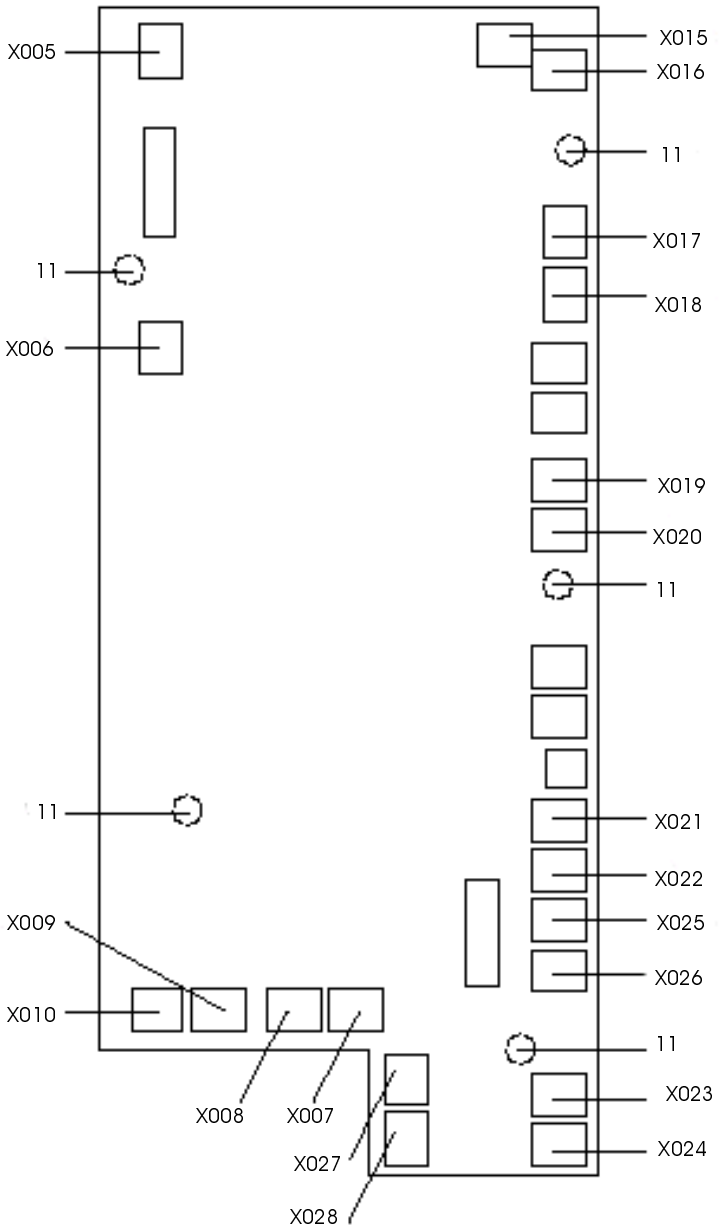
The board is now free.

7.11 Removing the Power Interface Board

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove the external unit cables (7.6).
7. Remove the SmartSlot (7.7).
8. Remove the X001, X002, and X004 power interface board connectors.
9. Remove the contactor from the DIN bar.

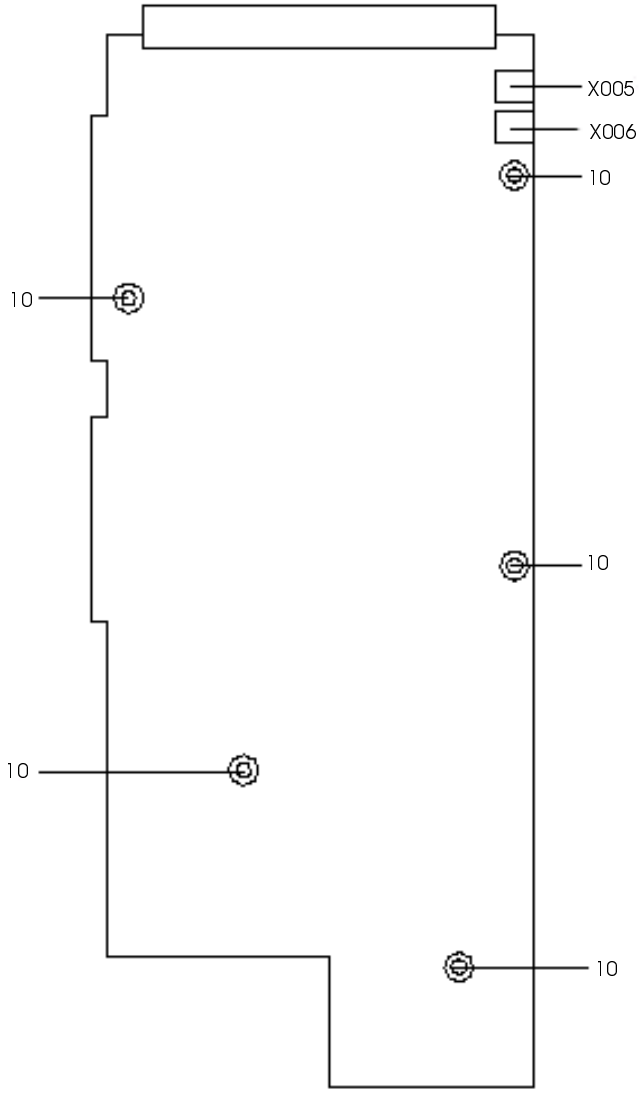


10. Remove the wires in X005, X006, X007, X008, X009, X010, X025, X026, X027, X028, X015, X016, X017, X018, X019, X020, X021, X022, X023, and X024.
11. Remove the screws connecting the power interface board.



7.12 Removing the Measuring and Supply Board

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove the external unit cables (7.6).
7. Remove the SmartSlot (7.7).
8. Remove the controller board (7.8).
9. Remove the power interface board (7.11).
10. Remove the stay.
11. Remove the X005 and X006 connectors.

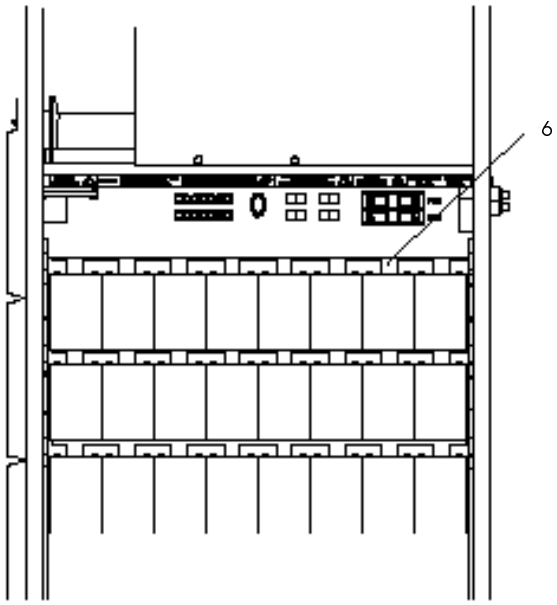


7.13 Removing the Batteries

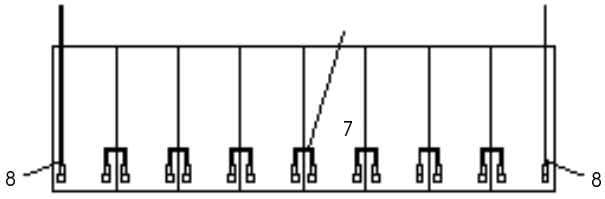
WARNING: HIGH VOLTAGE

Safety precautions for working with high voltage must be kept.

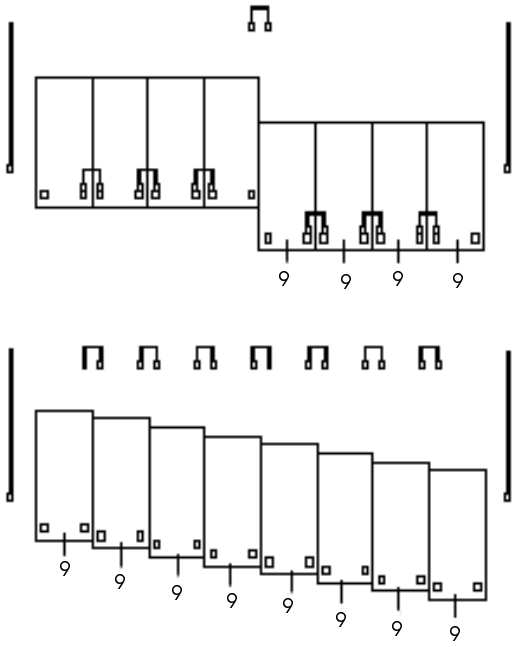
1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Move the shelf above the upper battery slightly upwards and pull it out.



7. Remove the interconnection wire between the two center batteries.
8. Remove the two outermost battery cables on the battery set.



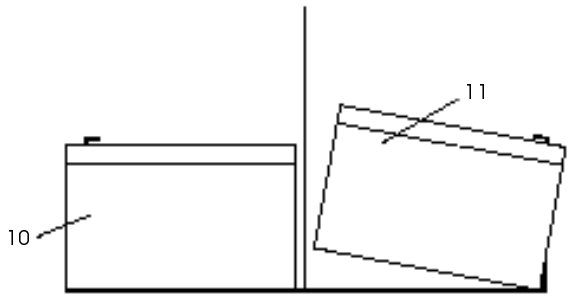
9. Remove the four sections batteries and put them aside, or remove all connecting wires and remove batteries one at a time.



Repeat steps 1 to 4 until all batteries are removed.

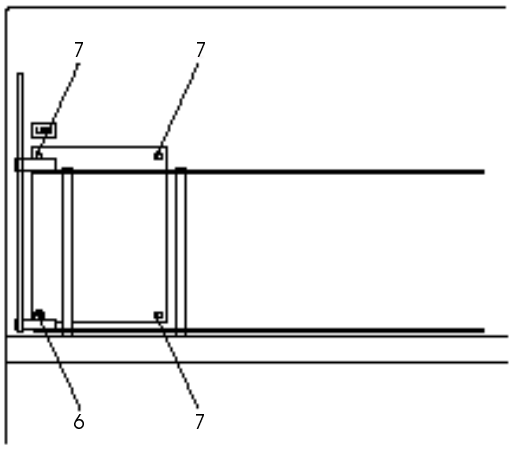
NOTE: The bottom battery section cannot be removed on account of the edge of the chassis. Therefore the battery must be tilted.

10. Move the battery to the side edge.
11. Tilt the battery and remove it.

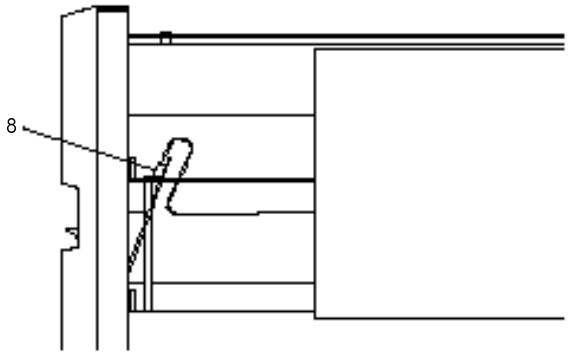


7.14 Removing the LED- Board

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove the screw from the board.
7. Loosen the board from the board holder.



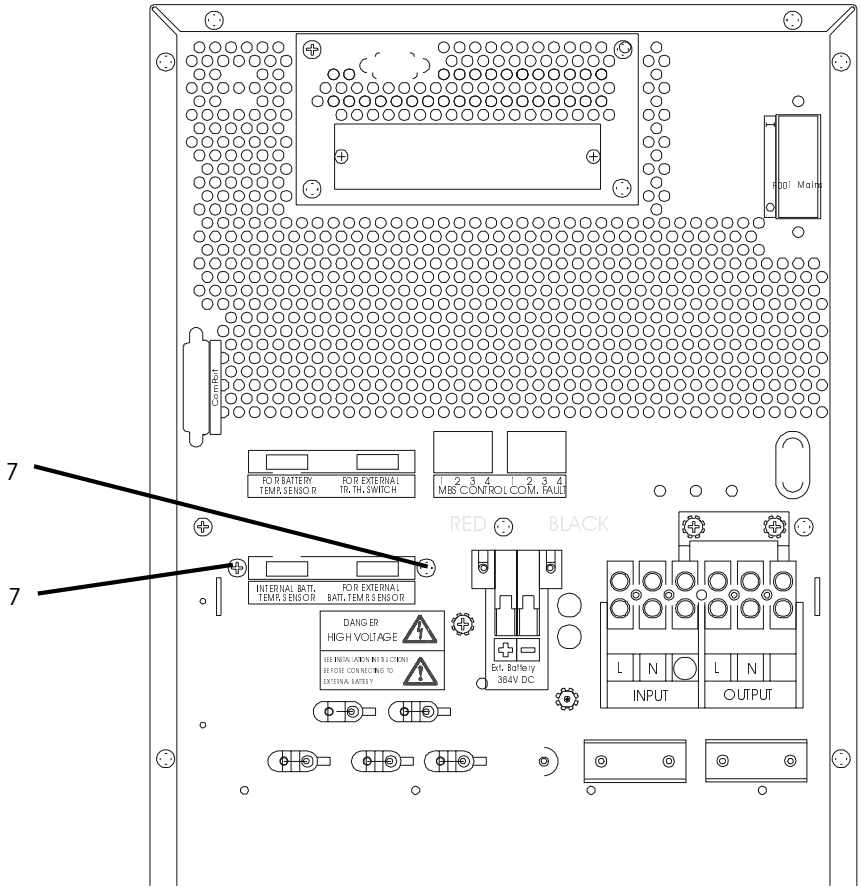
8. Tilt the board slightly and remove the ribbon cable connector.



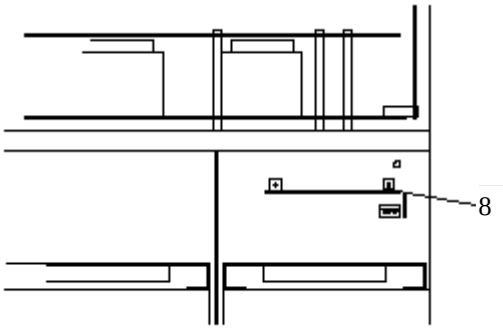
The board now is free.

7.15 Removing the Battery Temperature Sensor Board

1. Switch off the Smart-UPS DP (7.1).
2. Remove the cover (7.2).
3. Remove the external DC-Supply (7.3).
4. Open the Smart-UPS DP (7.4).
5. Remove the internal DC-supply (7.5).
6. Remove the external unit cables (7.6)
7. Remove the two screws on the rear side of the system, which keep the board.



8. Remove the battery temperature sensor board.

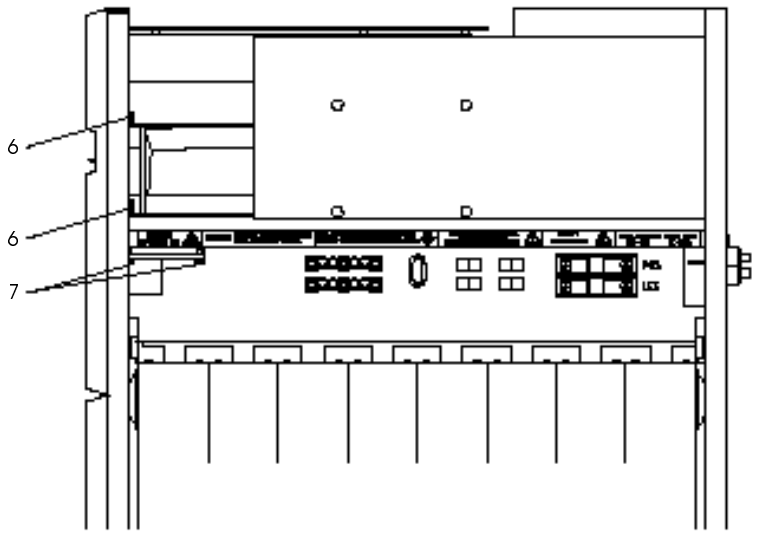


Remove Fan on Electronic Shelf

1. Switch off the Smart-UPS DP (7.1)
2. Remove cover (7.2)
3. Remove external DC-Supply (7.3)
4. Open the Smart-UPS DP (7.4)
5. Remove internal DC-supply (7.5)
6. Remove connector for fan on the power unit board X003 A and/or C.
7. Remove 4 nuts on fan.

WARNING

Take care not to drop screws and nuts!



8. Test/Adjustments After Repair

8.1 Test/Adjustments After Repair

Calibration of Smart-UPS DP Smart-UPS DP requires the following equipment:

- PC containing calibration software as well as calibration interface.
- Load, meaning both resistive load, SMPS load, as well as transformer.
- Voltmeter.
- Ammeter, possibly a current clamp.
- Scope, possibly a thermometer on account of temperature sensor.

Step refers to Calibration Software.

(Test Smart-UPS DP General, 7.100.542 and Step Description MPU_CAL1, 7.000.854GB)

If the calibration has to take place by the customer, there may be a problem with DC-Imbalance, because normally you would not bring along a transformer. The current limit may as well be difficult to calibrate.

Please test all points, or as many as possible.

8.2 Test of Smart-UPS DP in Connection with Service

Serial No.: _____ Rep. No.:_____

	Settings:
In/Output voltage	_____
In/Output frequency	_____
Battery capacity	_____
Operational mode (DP/Economy)	_____
Remote shutdown (ON/OFF)	_____
Remote shutdown polarity (Pos./Neg.)	_____
Remote shutdown time (30/120 sec.)	_____
Auto restart (ON/OFF)	_____
Spare tank (ON/OFF)	_____
Spare tank level (0/25/50%)	_____

Acoustic alarm level (High/Low) _____

Bypass voltage tolerance _____

Output frequency tolerance _____

Automatic battery test (OFF/Number of days) _____

Checked (✓)

* Indicates steps which must always be done.

8.1.1 Check PCB's and software revisions and updated according to EI's ❑

8.1.2 Check that fan is clean and it does not make any noise ❑

8.1.3 Check stand-by voltage on batteries, (V_{BATT}≥384V = 12.0V/btt.) or change batteries. ❑

8.1.4 Test Smart-UPS DP General, 7.100.542 and Step Description MPU_CAL1, 7.000.854GB. ❑

Possibly calibrate.

In connection with changing modules pay special attention to measuring signal on I_{IN}, I_{OUT}, V_{BATT}, V_{MAINS}, and V_{OUT} as well as DC-imbalance on the output.

8.1.5* Check charging voltage = 438V± 2% ❑

8.1.6* Check output voltage in mains operation with 100% resistive load (See App.1). ❑

Load as much as possible, but not more than 100%.

❑

Measure V_{OUT} V_{NOM} ± 2% ❑

Measure distortion on I_{IN} THD max. 10 %

8.1.7* Check output voltage in battery operation with 100% resistive load (See App.1). ❑

Load as much as possible, but not more than 100%.

❑

Measure V_{OUT} V_{NOM} ± 2% ❑

Measure output frequency 50/60Hz ± 0.1% ❑

Measure distortion on V_{OUT} Max. 4%

8.1.8 Check current limitation

Step 32 Enter 2 BYIH

Step 37 Enter 20 Under voltage timer

❑

Load the system with 100% (See App. 1). Check that the system indicates 100% load (4 green LED's are ON) and that the system is operating in normal operation.

8.1.9 Load the system with 110% (See App. 1). Check that the system indicates overload (4 red LED's are ON) and that the system is operating in normal operation. ❑

8.1.10 Load the system with 165% (See App.1). Check that:

- the system switches to battery operation. ❑
- the output current is reduced to 155% +4/-2% (See App.1). ❑
- After 30 seconds (±5 sec.) the output current is further reduced to 105 % +4/-2% (See App.1). ❑
- The system switches off after 5 seconds. ❑

8.1.11 Switch off the load.

Step 32 Enter 1 BYON

Step 37 Enter 5

8.1.12 Check lower switching off level -18% (See App.1). ❑

8.1.13 Check lower switching on level -9% (See App.1). ❑

8.1.14 Check upper switching off level + 12% (See App.1). ❑

8.1.15 Check upper switching on level +6.5% (See App.1). ❑

8.1.16* Check bypass with 100% resistive load (Apply S400 to CU)

Load as much as possible, but not more than 100%.

Measure V_{OUT}±5% (See App.1). ❑

8.1.17* Check relay functions on COM-port by means of test-box. ❑

8.1.18 Check remote shutdown by means of test-box. ❑

(Smart-UPS DP in battery operation).

8.3 Test of Options

Checked (✓)

8.2.1 Check Multicom; communication is tested by means of DP-Monitor (data transmitted). ❑

8.2.2 Check Compower 5/12V.

- 5V Compower = 5V±0.3V ❑
- 12V Compower = 10V ±1.2V ❑

8.2.3 Check remote display driver, mount remote display, and check the indicators. ❑

8.2.4 Check transformer module, fan + thermal switch OK. ❑

8.2.5* Concerned calibration steps:

Step 18	ALON	Alarm ON
Step 32	BYON	Bypass ON
Step 33	NOBI	No Burn-in
Step 35	TCMP	Temperature compensation of charging voltage
Step 37	5	Under voltage timer (seconds)
Step 40	HDIP	Hardware switches active
Step 30	BATF → Enter 1	Reset battery monitor

Step 20 Enter the output voltage stated in settings.

NOTE! If the output voltage has been changed during test, all AC levels are set at default. In that case it is necessary to check that the settings correspond with the settings stated in the test report.

Step 48 Switch the system into the operational mode stated in settings.

Enter the correct settings for the system.

8.4 APPENDIX 1.

Current limitation level

Currents in "A" as a function of output voltage and load in %

SUDP4OOOI				
100%	18.2	17.4	16.7	
105%	19.1	18.3	17.5	+0.8/-0.4
110%	20.0	19.1	18.3	
155%	28.2	27.0	25.8	+1.2/-0.5
165%	30.0	28.7	27.5	
SUDP6OOOI				
100%	27.3	26.1	25.0	
105%	28.6	27.4	26.3	+1.2/-0.6
110%	30.0	28.7	27.5	
155%	42.3	40.4	38.8	+1.8/-0.4
165%	45.0	43.0	41.3	
SUDP8OOOI				
100%	36.4	34.8	33.3	
105%	38.2	36.5	35.0	+1.6/-0.8
110%	40.0	38.3	36.7	
155%	56.4	53.9	51.7	+2.4/-1.0
165%	60.0	37.4	55.0	
SUDP1O0OOI				
100%	45.5	43.5	41.7	
105%	47.7	45.7	43.8	+2.0/-1.0
110%	50.0	47.8	45.8	
155%	70.5	67.4	64.6	+2.8/-1.4
165%	75.0	71.7	68.8	

Switching ON/ Switching OFF levels

Switching ON/OFF	220V	230V	240V	Tol.
Lower OFF / -18%	180.4V	188.6V	196.8V	±0.5V
Lower ON / -9%	200.2V	209.3V	218.4V	±0.5V
Upper OFF / +12%	246.4V	257.6V	268.8V	±0.5V
Upper ON / +6.5%	243.4V	245.0V	255.6V	±0.5V

Output voltage in bypass

	220V	230V	240V
Tol.	±11.0V	±11.6V	±12.0V

Output voltage V_{NOM}

	220V	230V	240V
Tol.	±4.4V	±4.6V	±4.8V

9. Service Bulletins

10. Data Sheet

Acrobat Document

11. User Guide (with Installation Guide Included)

990-1007e.doc